WHAT IS CLAIMED IS:

1   1.   A method of modifying old data, comprising:

2   transferring to a logic engine, new data in a first transfer operation, old data in a second

3   transfer operation; old first parity data in a third transfer operation and old second parity data in a

4   fourth transfer operation;

5   generating in said logic engine a new first parity data using said new data transferred to

6   said logic engine in said first transfer operation, said old data transferred to said logic engine in

7   said second transfer operation, and said old first parity data transferred to said logic engine in said

8   third transfer; and

9   generating in said logic engine a new second parity data using said new data transferred

10   to said logic engine in said first transfer operation, said old data transferred to said logic engine in

11   said second transfer operation, and said old second parity data transferred to said logic engine in

12   said fourth transfer operation.

1   2.   The method of claim 1 wherein said old data, old first parity data and old second

2   parity data are stored in a stripe of data stored across a plurality of storage devices.

1   3.   The method of claim 2 wherein said plurality of storage devices are arranged in a

2   Redundant Array of Independent Disks organization.

1   4.   The method of claim 3 wherein said new first parity data is horizontal parity data.

1   5.   The method of claim 4 wherein said new second parity data is diagonal parity

2   data.

1   6. The method of claim 1 wherein said generating in said logic engine a new first parity

2   data includes applying said new data transferred to said logic engine in said first transfer

3   operation, to a first store queue of said logic engine and performing an exclusive-OR logic

4   function operation on the contents of said first store queue and said applied new data, and

5   wherein said generating in said logic engine new second parity data includes applying said new

6   data transferred to said logic engine in said first transfer operation, to a second store queue of said

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7   logic engine, and performing an exclusive-OR logic function operation on the contents of said

8   second store queue and said applied new data.

1   7. The method of claim 6 wherein said generating in said logic engine a new first parity

2   data includes applying said old data transferred to said logic engine in said second transfer

3   operation, to said first store queue of said logic engine and performing an exclusive-OR logic

4   function operation on the contents of said first store queue and said applied old data, and wherein

5   said generating in said logic engine new second parity data includes applying said old data

6   transferred to said logic engine in said second transfer operation, to said second store queue of

7   said logic engine, and performing an exclusive-OR logic function operation on the contents of

8   said second store queue and said old data.

1   8. The method of claim 7 wherein said generating in said logic engine a new first parity

2   data includes applying said old first parity data transferred to said logic engine in said third

3   transfer operation, to said first store queue of said logic engine and performing an exclusive-OR

4   logic function operation on the contents of said first store queue and said applied old first parity

5   data, and wherein said generating in said logic engine new second parity data includes applying

6   said old second parity data transferred to said logic engine in said fourth transfer operation, to

7   said second store queue of said logic engine, and performing an exclusive-OR logic function

8   operation on the contents of said second store queue and said old second parity data.

1   9. The method of claim 1 wherein old data is transferred to said logic engine from a

2   volatile memory.

1   10. The method of claim 2 further comprising overwriting said old data in said stripe

2   with said new data, overwriting said old first parity data with said new first parity data and

3   overwriting said old second parity data with said new second parity data.

1   11.   An article comprising a storage medium, the storage medium comprising

2   machine readable instructions stored thereon to:

3   transfer to a logic engine, new data in a first transfer operation, old data in a second

4   transfer operation; old first parity data in a third transfer operation and old second parity data in a

5   fourth transfer operation;

6   generate in said logic engine a new first parity data using said new data transferred to said

7   logic engine in said first transfer operation, said old data transferred to said logic engine in said

8   second transfer operation, and said old first parity data transferred to said logic engine in said

9   third transfer; and

10   generate in said logic engine a new second parity data using said new data transferred to

11   said logic engine in said first transfer operation, said old data transferred to said logic engine in

12   said second transfer operation, and said old second parity data transferred to said logic engine in

13   said fourth transfer operation.

1   12.   The article of claim 11 wherein said old data, old first parity data and old second

2   parity data are stored in a stripe of data stored across a plurality of storage devices.

1   13.   The article of claim 12 wherein said plurality of storage devices are arranged in a

2   Redundant Array of Independent Disks organization.

1   14.   The article of claim 13 wherein said new first parity data is horizontal parity data.

1   15.   The article of claim 14 wherein said new second parity data is diagonal parity

2   data.

1   16. The article of claim 11 wherein the machine readable instructions to generate in said

2   logic engine a new first parity data include machine readable instructions stored on the storage

3   medium to apply said new data transferred to said logic engine in said first transfer operation, to a

4   first store queue of said logic engine and to perform an exclusive-OR logic function operation on

5   the contents of said first store queue and said applied new data, and wherein the machine readable

6   instructions to generate in said logic engine new second parity data include machine readable

7   instructions stored on the storage medium to apply said new data transferred to said logic engine

8   in said first transfer operation, to a second store queue of said logic engine, and to perform an

9   exclusive-OR logic function operation on the contents of said second store queue and said applied

10   new data.

1   17. The article of claim 16 wherein the machine readable instructions to generate in said

2   logic engine a new first parity data include machine readable instructions stored on the storage

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3   medium to apply said old data transferred to said logic engine in said second transfer operation, to

4   said first store queue of said logic engine and to perform an exclusive-OR logic function

5   operation on the contents of said first store queue and said applied old data, and wherein the

6   machine readable instructions to generate in said logic engine new second parity data include

7   machine readable instructions stored on the storage medium to apply said old data transferred to

8   said logic engine in said second transfer operation, to said second store queue of said logic

9   engine, and to perform an exclusive-OR logic function operation on the contents of said second

10   store queue and said old data.

1   18. The article of claim 17 wherein the machine readable instructions to generate in said

2   logic engine a new first parity data include machine readable instructions stored on the storage

3   medium to apply said old first parity data transferred to said logic engine in said third transfer

4   operation, to said first store queue of said logic engine and to perform an exclusive-OR logic

5   function operation on the contents of said first store queue and said applied old first parity data,

6   and wherein the machine readable instructions to generate in said logic engine new second parity

7   data include machine readable instructions stored on the storage medium to apply said old second

8   parity data transferred to said logic engine in said fourth transfer operation, to said second store

9   queue of said logic engine, and to perform an exclusive-OR logic function operation on the

10   contents of said second store queue and said old second parity data.

1   19. The article of claim 11 wherein old data is transferred to said logic engine from a

2   volatile memory.

1   20. The article of claim 12 wherein the storage medium further comprises machine

2   readable instructions stored thereon to overwrite said old data in said stripe with said new data,

3   overwrite said old first parity data with said new first parity data and overwrite said old second

4   parity data with said new second parity data.

1   21.   A system, comprising:

2   at least one memory which includes an operating system and an application;

3   a processor coupled to the memory;

4   data storage which includes a plurality of storage devices;

5   a data storage processor adapted to manage Input/Output (I/O) access to the data

6   storage, data storage processor including a logic engine; and

7   a device driver executable by the processor in the memory, wherein at least one

8   of the operating system, device driver and the storage processor is adapted to:

9   transfer to said logic engine, new data in a first transfer operation, old data in a second

10   transfer operation; old first parity data in a third transfer operation and old second parity data in a

11   fourth transfer operation;

12   generate in said logic engine a new first parity data using said new data transferred to said

13   logic engine in said first transfer operation, said old data transferred to said logic engine in said

14   second transfer operation, and said old first parity data transferred to said logic engine in said

15   third transfer; and

16   generate in said logic engine a new second parity data using said new data transferred to

17   said logic engine in said first transfer operation, said old data transferred to said logic engine in

18   said second transfer operation, and said old second parity data transferred to said logic engine in

19   said fourth transfer operation.

1   22.   The system of claim 21 wherein said old data, old first parity data and old second

2   parity data are stored in a stripe of data stored across said plurality of storage devices.

1   23.   The system of claim 22 wherein said plurality of storage devices are arranged in

2   a Redundant Array of Independent Disks organization.

1   .   24.   The system of claim 23 wherein said new first parity data is horizontal parity

2   data.

1   25.   The system of claim 24 wherein said new second parity data is diagonal parity

2   data.

1   26. The system of claim 21 wherein said generating in said logic engine a new first

2   parity data, applies said new data transferred to said logic engine in said first transfer operation, to

3   a first store queue of said logic engine and performs an exclusive-OR logic function operation on

4 the contents of said first store queue and said applied new data, and wherein said generating in

5 said logic engine new second parity data, applies said new data transferred to said logic engine in

6 said first transfer operation, to a second store queue of said logic engine, and performs an

7 exclusive-OR logic function operation on the contents of said second store queue and said applied

8 new data.

1 27. The system of claim 26 wherein said generating in said logic engine a new first

2 parity data, applies said old data transferred to said logic engine in said second transfer operation,

3 to said first store queue of said logic engine and performs an exclusive-OR logic function

4 operation on the contents of said first store queue and said applied old data, and wherein said

5 generating in said logic engine new second parity data, applies said old data transferred to said

6 logic engine in said second transfer operation, to said second store queue of said logic engine, and

7 performs an exclusive-OR logic function operation on the contents of said second store queue and

8 said old data.

1 28. The system of claim 27 wherein said generating in said logic engine a new first

2 parity data, applies said old first parity data transferred to said logic engine in said third transfer

3 operation, to said first store queue of said logic engine and performs an exclusive-OR logic

4 function operation on the contents of said first store queue and said applied old first parity data,

5 and wherein said generating in said logic engine new second parity data, applies said old second

6 parity data transferred to said logic engine in said fourth transfer operation, to said second store

7 queue of said logic engine, and performs an exclusive-OR logic function operation on the

8 contents of said second store queue and said old second parity data.

1 29. The system of claim 21 further comprising a video controller coupled to said

2 processor.

1 30. The system of claim 22 wherein said at least one of the operating system, device

2 driver and the storage processor is further adapted to overwrite said old data in said stripe with

3 said new data, overwrite said old first parity data with said new first parity data and overwrite

4 said old second parity data with said new second parity data.

1   31.   A storage processor for use with a data storage having a plurality of data storage

2   units, comprising:

3   a memory;

4   a logic engine; and

5   a processing unit adapted to:

6   transfer to said logic engine, new data in a first transfer operation, old

7   data in a second transfer operation; old first parity data in a third transfer operation and old

8   second parity data in a fourth transfer operation;

9   generate in said logic engine a new first parity data using said new data

10   transferred to said logic engine in said first transfer operation, said old data transferred to said

11   logic engine in said second transfer operation, and said old first parity data transferred to said

12   logic engine in said third transfer; and

13   generate in said logic engine a new second parity data using said new

14   data transferred to said logic engine in said first transfer operation, said old data transferred to

15   said logic engine in said second transfer operation, and said old second parity data transferred to

16   said logic engine in said fourth transfer operation.

1   32.   The storage processor of claim 31 wherein said old data, old first parity data and

2   old second parity data are stored in a stripe of data stored across said plurality of storage devices.

1   33.   The storage processor of claim 32 wherein said plurality of storage devices are

2   arranged in a Redundant Array of Independent Disks organization.

1   34.   The storage processor of claim 33 wherein said new first parity data is horizontal

2   parity data.

1   35.   The storage processor of claim 34 wherein said new second parity data is

2   diagonal parity data.

1   36. The storage processor of claim 31 wherein said generating in said logic engine a new

2   first parity data, applies said new data transferred to said logic engine in said first transfer

3   operation, to a first store queue of said logic engine and performs an exclusive-OR logic function

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4 operation on the contents of said first store queue and said applied new data, and wherein said

5 generating in said logic engine new second parity data, applies said new data transferred to said

6 logic engine in said first transfer operation, to a second store queue of said logic engine, and

7 performs an exclusive-OR logic function operation on the contents of said second store queue and

8 said applied new data.

1 37. The storage processor of claim 36 wherein said generating in said logic engine a new

2 first parity data, applies said old data transferred to said logic engine in said second transfer

3 operation, to said first store queue of said logic engine and performs an exclusive-OR logic

4 function operation on the contents of said first store queue and said applied old data, and wherein

5 said generating in said logic engine new second parity data, applies said old data transferred to

6 said logic engine in said second transfer operation, to said second store queue of said logic

7 engine, and performs an exclusive-OR logic function operation on the contents of said second

8 store queue and said old data.

1 38. The storage processor of claim 37 wherein said generating in said logic

2 engine a new first parity data, applies said old first parity data transferred to said logic

3 engine in said third transfer operation, to said first store queue of said logic engine and

4 performs an exclusive-OR logic function operation on the contents of said first store

5 queue and said applied old first parity data, and wherein said generating in said logic

6 engine new second parity data, applies said old second parity data transferred to said

7 logic engine in said fourth transfer operation, to said second store queue of said logic

8 engine, and performs an exclusive-OR logic function operation on the contents of said

9 second store queue and said old second parity data.

1 39. The storage processor of claim 32 wherein said processing unit is further

2 adapted to overwrite said old data in said stripe with said new data, overwrite said old

3 first parity data with said new first parity data and overwrite said old second parity data

4 with said new second parity data.